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Characteristics Associated With Out-of-Hospital Cardiac Arrests and Resuscitations During the Novel Coronavirus Disease 2019 Pandemic in New York City.

Lai PH(1), Lancet EA(1), Weiden MD(2)(3), Webber MP(2)(4), Zeig-Owens R(2)(4)(5), Hall CB(6), Prezant DJ(1)(2)(5).

Abstract

Importance: Risk factors for out-of-hospital death due to novel coronavirus disease 2019 (COVID-19) are poorly defined. From March 1 to April 25, 2020, New York City, New York (NYC), reported 17 118 COVID-19-related deaths. On April 6, 2020, out-of-hospital cardiac arrests peaked at 305 cases, nearly a 10-fold increase from the prior year. Objective: To describe the characteristics (race/ethnicity, comorbidities, and emergency medical services [EMS] response) associated with outpatient cardiac arrests and death during the COVID-19 pandemic in NYC. Design, Setting, and Participants: This population-based, cross-sectional study compared patients with out-of-hospital cardiac arrest receiving resuscitation by the NYC 911 EMS system from March 1 to April 25, 2020, compared with March 1 to April 25, 2019. The NYC 911 EMS system serves more than 8.4 million people. Exposures: The COVID-19 pandemic. Main Outcomes and Measures: Characteristics associated with out-of-hospital arrests and the outcomes of out-of-hospital cardiac arrests. Results: A total of 5325 patients were included in the main analysis (2935 men [56.2%]; mean [SD] age, 71 [18] years), 3989 in the COVID-19 period and 1336 in the comparison period. The incidence of nontraumatic out-of-hospital cardiac arrests in those who underwent EMS resuscitation in 2020 was 3 times the incidence in 2019 (47.5/100 000 vs 15.9/100 000). Patients with out-of-hospital cardiac arrest during 2020 were older (mean [SD] age, 72 [18] vs 68 [19] years), less likely to be white (611 of 2992 [20.4%] vs 382 of 1161 [32.9%]), and more likely to have hypertension (2134 of 3989 [53.5%] vs 611 of 1336 [45.7%]), diabetes (1424 of 3989 [35.7%] vs 348 of 1336 [26.0%]), and physical limitations (2259 of 3989 [56.6%] vs 634 of 1336 [47.5%]). Compared with 2019, the odds of asystole

increased in the COVID-19 period (odds ratio [OR], 3.50; 95% CI, 2.53-4.84; P < .001), as did the odds

of pulseless electrical activity (OR, 1.99; 95% CI, 1.31-3.02; P = .001). Compared with 2019, the

COVID-19 period had substantial reductions in return of spontaneous circulation (ROSC) (727 of 3989

patients [18.2%] vs 463 of 1336 patients [34.7%], P < .001) and sustained ROSC (423 of 3989 patients

[10.6%] vs 337 of 1336 patients [25.2%], P < .001), with fatality rates exceeding 90%. These

associations remained statistically significant after adjustment for potential confounders (OR for

ROSC, 0.59 [95% CI, 0.50-0.70; P < .001]; OR for sustained ROSC, 0.53 [95% CI, 0.43-0.64; P < .001]).

Conclusions and Relevance: In this population-based, cross-sectional study, out-of-hospital cardiac

arrests and deaths during the COVID-19 pandemic significantly increased compared with the same

period the previous year and were associated with older age, nonwhite race/ethnicity, hypertension,

diabetes, physical limitations, and nonshockable presenting rhythms. Identifying patients with the

greatest risk for out-of-hospital cardiac arrest and death during the COVID-19 pandemic should allow

for early, targeted interventions in the outpatient setting that could lead to reductions in out-of-

hospital deaths.´

FREE FULL TEXT

<mark>**COVID-19 in cardiac arrest and infection risk to rescuers: A systematic review.**</mark>

Couper K(1), Taylor-Phillips S(2), Grove A(2), Freeman K(2), Osokogu O(2), Court R(2), Mehrabian

A(3), Morley PT(4), Nolan JP(5), Soar J(6), Perkins GD(7).

Abstract

BACKGROUND: There may be a risk of COVID-19 transmission to rescuers delivering treatment for

cardiac arrest. The aim of this review was to identify the potential risk of transmission associated

with key interventions (chest compressions, defibrillation, cardiopulmonary resuscitation) to inform

international treatment recommendations. METHODS: We undertook a systematic review

comprising three questions: (1) aerosol generation associated with key interventions; (2) risk of

airborne infection transmission associated with key interventions; and (3) the effect of different

personal protective equipment strategies. We searched MEDLINE, Embase, Cochrane Central

Register of Controlled Trials, and the World Health Organization COVID-19 database on 24th March 2020. Eligibility criteria were developed individually for each question. We assessed risk of bias for individual studies, and used the GRADE process to assess evidence certainty by outcome. RESULTS: We included eleven studies: two cohort studies, one case control study, five case reports, and three manikin randomised controlled trials. We did not find any direct evidence that chest compressions or defibrillation either are or are not associated with aerosol generation or transmission of infection. Data from manikin studies indicates that donning of personal protective equipment delays treatment delivery. Studies provided only indirect evidence, with no study describing patients with COVID-19. Evidence certainty was low or very low for all outcomes. CONCLUSION: It is uncertain whether chest compressions or defibrillation cause aerosol generation or transmission of COVID-19 to rescuers. There is very limited evidence and a rapid need for further studies.

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RCP / COMPRESSIONS TORÀCIQUES MECÀNIQUES

Evaluation of manual chest compressions according to the updated cardiopulmonary resuscitation guidelines and the impact of feedback devices in an educational resuscitation course.

Urushibata N(1), Murata K(2), Endo H(2), Yoshiyuki A(2), Otomo Y(3).

Abstract

BACKGROUND: The cardiopulmonary resuscitation guidelines revised in 2015 recommend target chest compression rate (CCR) and chest compression depth (CCD) of 100-120 compressions per minute (cpm) and 5-6 cm, respectively. We hypothesized that the new guidelines are harder to comply with, even with proper feedback. METHODS: This prospective observational study using data collected from the participants of an Immediate Cardiac Life Support course included the evaluation of chest compressions using performance data from a feedback device after the completion of the course. Participants completed chest compressions for 1 min and were provided with feedback, after which they performed another cycle of CC. Primary outcome measures were CCR and CCD as well as

the correct CCR percentage and CCD percentage for pre and post feedback. RESULTS: The study

included a total of 88 participants. The median pre-CCR was 112.5 cpm (interquartile range [IQR]

108-116 cpm), and the median correct pre-CCR percentage was 96% (IQR 82.5-99.5%). After the

feedback, there was a slight increase in the correct CCR percentage (99% [IQR 92.5-100%]).

Conversely, the median pre-CCD was 5.4 cm (IQR 4.9-5.8 cm), and the median pre-correct CCD

percentage was 66% (IQR 18.5-90%). The increase in the median post-correct CCD percentage to

72% (IQR 27-94%) observed after the feedback was not statistically significant (P = 0.361).

CONCLUSIONS: Compliance with the new guidelines for chest compressions, especially those

regarding the CCD, might be difficult. However, whether the changes in guidelines affect outcomes

in actual clinical settings is uncertain and requires further investigation.

FREE FULL TEXT

Restoration of the electrocardiogram during mechanical cardiopulmonary resuscitation.

Isasi I(1), Irusta U(2), Aramendi E(3), H Idris A(4), Sörnmo L(5).

Abstract

OBJECTIVE: An artefact-free electrocardiogram (ECG) is essential during cardiac arrest to decide

therapy such as defibrillation. Mechanical cardiopulmonary resuscitation (CPR) devices cause

movement artefacts that alter the ECG. This study analyzes the efectiveness of mechanical CPR

artefact suppression filters to restore clinically relevant ECG information. APPROACH: In total, 495

10-s ECGs were used, of which 165 were in ventricular fibrillation (VF), 165 in organized rhythms

(OR) and 165 contained mechanical CPR artefacts recorded during asystole. CPR artefacts and

rhythms were mixed at controlled signal-to-noise ratios (SNRs), ranging from -20 dB to 10 dB.

Mechanical artefacts were removed using least mean squares (LMS), recursive least squares (RLS)

and Kalman filters. Performance was evaluated by comparing the clean and the restored ECGs in

terms of restored SNR, correlation-based similarity measures, and clinically relevant features: QRS

detection performance for OR, and dominant frequency, mean amplitude and waveform irregularity

for VF. For each filter, a shock/no-shock support vector machine algorithm based on multiresolution

analysis of the restored ECG was designed, and evaluated in terms of sensitivity (Se) and specificity (Sp). MAIN RESULTS: The RLS filter produced the largest correlation coefficient (0.80), the largest average increase in SNR (9.5 dB), and the best QRS detection performance. The LMS filter best restored VF with errors of 10.3% in dominant frequency, 18.1% in amplitude and 11.8% in waveform irregularity. The Se/Sp of the diagnosis of the restored ECG were 95.1/94.5% using the RLS filter and 97.0/91.4% using the LMS filter. SIGNIFICANCE: Suitable filter configurations to restore ECG waveforms during mechanical CPR have been determined, allowing reliable clinical decisions without interrupting mechanical CPR therapy.

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ACR INTRAHOSPITALÀRIA

Associations of thoracic cage size and configuration with outcomes of adult in-hospital cardiac arrest: A retrospective cohort study.

Pei-Chuan Huang E(1), Fu CM(2), Chang WT(2), Huang CH(2), Tsai MS(2), Chou E(3), Wolfshohl J(4), Wang CH(5), Wu YW(6), Chen WJ(7).

Abstract

BACKGROUND: To analyse the association of thoracic cage size and configuration with outcomes following in-hospital cardiac arrest (IHCA). METHODS: A single-centred retrospective study was conducted. Adult patients experiencing IHCA during 2006-2015 were screened. By analysing computed tomography images, we measured thoracic anterior-posterior and transverse diameters, circumference, and both anterior and posterior subcutaneous adipose tissue (SAT) depths at the

level of the internipple line (INL). We also recorded the anatomical structure located immediately

posterior to the sternum at the INL. RESULTS: A total of 649 patients were included. The median

thoracic circumference was 88.6 cm. The median anterior and posterior thoracic SAT depths were

0.9 and 1.5 cm, respectively. The ascending aorta was found to be the most common retrosternal

structure (57.6%) at the INL. Multivariate logistic regression analyses indicated that anterior thoracic

SAT depth of 0.8-1.6 cm (odds ratio [OR]: 2.98, 95% confidence interval [CI]: 1.40-6.35; p-

value = 0.005) and thoracic circumference of 83.9-95.0 cm (OR: 2.48, 95% CI: 1.16-5.29; p-

value = 0.02) were positively associated with a favourable neurological outcome while left

ventricular outflow track or aortic root beneath sternum at the level of INL was inversely associated

with a favourable neurological outcome (OR: 0.37, 95% CI: 0.15-0.91; p-value = 0.03). CONCLUSION:

Thoracic circumference and anatomic configuration might be associated with IHCA outcomes. This

proof-of-concept study suggested that a one-size-fits-all resuscitation technique might not be

suitable. Further investigation is needed to investigate the method of providing personalized

resuscitation tailored to patient needs.

FREE FULL TEXT

Shortening of low-flow duration over time was associated with improved outcomes of

extracorporeal cardiopulmonary resuscitation in in-hospital cardiac arrest.

Higashi A(1), Nakada TA(1), Imaeda T(1), Abe R(1), Shinozaki K(2), Oda S(1).

Abstract

Introduction: Quality improvement in the administration of extracorporeal cardiopulmonary

resuscitation (ECPR) over time and its association with low-flow duration (LFD) and outcomes of

cardiac arrest (CA) have been insufficiently investigated. In this study, we hypothesized that quality

improvement in efforts to shorten the duration of initiating ECPR had decreased LFD over the last

15 years of experience at an academic tertiary care hospital, which in turn improved the outcomes

of in-hospital CA (IHCA). Methods: This was a single-center retrospective observational study of

ECPR patients between January 2003 and December 2017. A rapid response system (RRS) and an

extracorporeal membrane oxygenation (ECMO) program were initiated in 2011 and 2013. First, the

association of LFD per minute with the 90-day mortality and neurological outcome was analyzed using multiple logistic regression analysis. Then, the temporal changes in LFD were investigated. Results: Of 175 study subjects who received ECPR, 117 had IHCA. In the multivariate logistic regression, IHCA patients with shorter LFD experienced significantly increased 90-day survival and favorable neurological outcomes (LFD per minute, 90-day survival: odds ratio [OR] = 0.97, 95% confidence interval [CI] = 0.94-1.00, P = 0.032; 90-day favorable neurological outcome: OR = 0.97,

95% CI = 0.94-1.00, P = 0.049). In the study period, LFD significantly decreased over time (slope - 5.39 [min/3 years], P < 0.0001). Conclusion: A shorter LFD was associated with increased 90-day survival and favorable neurological outcomes of IHCA patients who received ECPR. The quality improvement in administering ECPR over time, including the RRS program and the ECMO program, appeared to ameliorate clinical outcomes.

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VENTILACIÓ

Effects of Using an Endotracheal Tube Introducer for Intubation During Mechanical Chest Compressions of a Manikin: Randomized, Prospective, Crossover Study.

Ozbek AE(1), Halhalli HC(1), Yilmaz S(2), Celik E(1), Ozerol H(1), Şancı E(1).

Abstract

BACKGROUND: Airway management methods during out-of-hospital cardiac arrest remain controversial. OBJECTIVES: This study aimed to compare the impact of using an endotracheal tube introducer with a Macintosh laryngoscope on the first-pass success rates of final-year medical students on a manikin during continuous chest compressions with a mechanical compression device.

METHODS: Fifty-two final-year students of the faculty of medicine performed endotracheal intubations on a manikin using the Macintosh laryngoscope with and without the endotracheal tube introducer during chest compressions. First-pass success rates, the times of endotracheal intubations, the second endotracheal intubation attempt success rates, and the difficulty level of each method according to the participants' perceptions were measured. RESULTS: First-pass success rates did not differ using an endotracheal tube introducer as an adjunct to a Macintosh laryngoscope. Second endotracheal intubation attempt success rates also did not differ by endotracheal tube introducer use. The usage of an endotracheal tube introducer required significantly longer endotracheal intubation time than using only a Macintosh laryngoscope. The perception of difficulty was significantly lower with endotracheal tube introducer use. CONCLUSION: The use of an endotracheal tube introducer as an adjunct to a Macintosh laryngoscope is not associated with higher first-pass success rates during mechanical chest compressions in adult simulations performed by final-year medical students.

ECOGRAFIA

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MONITORATGE CEREBRAL

1. Resuscitation. 2020 Jun 15. pii: S0300-9572(20)30245-8. doi:

10.1016/j.resuscitation.2020.06.009. [Epub ahead of print]

The relationship between no-flow interval and survival with favourable neurological outcome in out-of-hospital cardiac arrest: Implications for outcomes and ECPR eligibility.

Guy A(1), Kawano T(2), Besserer F(3), Scheurmeyer F(4), Kanji HD(5), Christenson J(6), Grunau B(7).

Abstract

BACKGROUND: The "no flow" interval is the time from out-of-hospital cardiac arrest (OHCA) to cardiopulmonary resuscitation (CPR). Its prognostic value is important to define for prehospital resuscitation decisions, post-resuscitation care and prognostication, and extracorporeal

cardiopulmonary resuscitation (ECPR) candidacy assessment. METHODS: We examined bystander-witnessed OHCAs without bystander CPR from two Resuscitation Outcomes Consortium datasets. We used modified poisson regression to model the relationship between the no-flow interval (9-1-1 call to professional resuscitation) and favourable neurological outcome (Modified Rankin Score ≤3) at hospital discharge. Furthermore, we identified the no-flow interval beyond which no patients had a favourable outcome. We analyzed a subgroup to simulate ECPR-treated patients (witnessed arrest, age<65, non-asystole initial rhythm, and>30minutes until return of circulation). RESULTS: Of 43 593 cases, we included 7 299; 616 (8.4%) had favourable neurological outcomes. Increasing no-flow interval was inversely associated with favourable neurological outcomes (adjusted relative risk 0.87,

95% CI 0.85 - 0.90); the adjusted probability of a favourable neurological outcome decreased by 13% (95% CI 10 - 15%) per minute. No patients (0/7299, 0%; 1-sided 97.5% CI 0-0.051%) had both a no-flow interval>20minutes and a favourable neurological outcome. In the hypothetical ECPR group, 0/152 (0%; 1-sided 97.5% CI 0 - 2.4%) had both a no-flow interval>10minutes and a favourable neurological outcome. CONCLUSIONS: The probability of a favourable neurological outcome in OHCA decreases by 13% for every additional minute of no-flow time until high-quality CPR, with the possibility of favourable outcomes up to 20minutes.

The Association between Post-Cardiac Arrest Cerebral Oxygenation and Survival with Favorable Neurological Outcomes: A Multicenter Study.

Tran LN(1), Patel J(1), Yang J(1), O'Neill C(1), Yin D(2), Nguyen R(1), Pogson D(3), Deakin C(4), Harris T(5), Brett S(6), Page V(7), Parnia S(8).

Abstract

OBJECTIVE: Cerebral oximetry is a non-invasive system that uses near infrared spectroscopy to measure regional cerebral oxygenation (rSO2) in the frontal lobe of the brain. Post-cardiac arrest rSO2 may be associated with survival and neurological outcomes in out-of-hospital cardiac arrest patients; however, no studies have examined relationships between rSO2 and neurological outcomes

following in-hospital cardiac arrest (IHCA). We tested the hypothesis that rSO2 following IHCA is associated with survival and favorable neurological outcomes. DESIGN: Prospective study from nine acute care hospital in the United States and United Kingdom. PATIENTS: Convenience sample of IHCA patients admitted to the intensive care unit with post-cardiac arrest syndrome. INTERVENTIONS: Cerebral oximetry monitoring (Equanox 7600, Nonin Medical, MN, USA) during the first 48 hours after IHCA. MEASUREMENTS AND MAIN RESULTS: Subject's rSO2 was calculated as the mean of collected data at different time intervals: hourly between 1-6 hour, 6-12 hr, 12-18hr, 18-24 hr and 24-48hr. Demographic data pertaining to possible confounding variables for rSO2 and primary outcome were collected. The primary outcome was survival with favorable neurological outcomes (cerebral performance scale [CPC] 1-2) vs severe neurological injury or death (CPC 3-5) at hospital discharge. Univariate and multivariate statistical analyses were performed to correlate cerebral oximetry values and other variables with the primary outcome. Among 87 studied patients, 26 (29.9%) achieved CPC1-2. A significant difference in mean rSO2 was observed during hours 1-2 after IHCA in CPC 1-2 vs CPC3-5 (73.08 vs. 66.59, p = 0.031) but not at other time intervals. There were no differences in age, Charlson comorbidity index, APACHE II scores, CPR duration, mean arterial pressure, PaO2, PaCO2, and hemoglobin levels between two groups. CONCLUSIONS: There may be a significant physiological difference in rSO2 in the first two hours after ROSC in IHCA patients who achieve favorable neurological outcomes, however, this difference may not be clinically significant.

ORGANITZACIÓ I ENTRENAMENT

The impact of cardiopulmonary resuscitation (CPR) training on schoolchildren and their CPR knowledge, attitudes toward CPR, and willingness to help others and to perform CPR: mixed methods research design.

Pivač S(1), Gradišek P(2), Skela-Savič B(3).

Abstract

BACKGROUND: The benefits of cardiopulmonary resuscitation training for schoolchildren are well known, but the appropriate age for introducing training is still being discussed. This is a very important issue, since out-of-hospital cardiac arrest is a major public health concern. The objective of this study was to investigate the effects of implemented cardiopulmonary resuscitation training on the knowledge of schoolchildren in the last three grades of Slovenian elementary schools and theirs willingness, attitudes, and intentions toward helping others and performing cardiopulmonary resuscitation. The experience of training instructors was also explored. METHODS: A mixed methods research design was employed, using a Separate Pre-Post Samples Design and focus groups. Research was conducted in 15 Slovenian public elementary schools offering cardiopulmonary resuscitation training. Focus groups included training instructors and developers. Data was collected with a structured questionnaire from April to June 2018 and analyzed using univariate and bivariate analyses. The three focus groups were convened in September and October 2018. Content analysis of the discussion transcriptions was conducted. The sample included 764 schoolchildren aged 12.5-14.5 years before cardiopulmonary resuscitation training and 566 schoolchildren after training. Three non-homogeneous focus groups included eight cardiopulmonary resuscitation instructors. RESULTS: Significant progress in cardiopulmonary resuscitation knowledge was noted after training implementation, with the greatest progress seen in the youngest age group (mean age 12.5). The greatest increase after training was seen for the variables Attitude toward helping others (p = 0.001) and Self-confidence (p = 0.001). Analysis of the focus groups yielded two themes: (a) the effects of cardiopulmonary resuscitation training on schoolchildren, and (b) the systemic responsibility of the school system and professional bodies. CONCLUSIONS: Significant progress in schoolchildren's cardiopulmonary resuscitation knowledge after training was established. Early introduction of training is recommended. Cardiopulmonary resuscitation knowledge raises awareness of the responsibility to help others and increases self-confidence to provide bystander cardiopulmonary resuscitation. It can be concluded that early cardiopulmonary resuscitation training for children is crucial. It should be a mandatory part of school curricula in those countries where cardiopulmonary resuscitation is not yet mandatory.

FREE FULL TEXT

External Cardiac Massage Training of Medical Students: A Randomized Comparison of Two Feedback Methods to Standard Training.

Suet G(1), Blanie A(1), de Montblanc J(1), Roulleau P(1), Benhamou D(1).

Abstract

BACKGROUND: The most recent recommendations support learning of external cardiac massage (ECM) through feedback devices. OBJECTIVES: The objective was to compare the effects on immediate and 3-month retention of ECM technical skills when using feedback devices compared with training without feedback as part of a half-day training session in medical students. METHODS: This randomized study was performed using the Resusci Anne QCPR manikin in 64 medical students.

We compared the quality of ECM with nonfeedback training in the control group (group 1) vs. 2 feedback learning methods (group 2, PocketCPR and group 3, Skill Reporter each used with visual display available to the trainee). At the end of the training session and 3 months later, students performed chest compressions blindly during a 2-min assessment session. The median compression score was the primary outcome for assessing immediate and long-term retention. RESULTS: Regarding immediate retention, the median compression score was significantly lower in group 1 (23%) than in groups 2 (81%) and 3 (72%) (p < 0.05) with no difference between the 2 feedback methods. At 3 months, mean compression scores remained high but not significantly different between the 2 feedback groups. CONCLUSION: The use of a feedback device used for ECM training improves the quality of immediate retention of technical ECM skills compared with traditional teaching in medical students. At 3 months, the 2 groups with feedback retained a high level of performance. No significant difference could be demonstrated between the 2 feedback methods.

A concept of the pioneer regional Out-of-Hospital Cardiac Arrest Program development to improve the outcomes of patients with out-of-hospital cardiac arrest.

Sip M, Puślecki M, Kłosiewicz T, Zalewski R, Dąbrowski M, Ligowski M, Goszczyńska E, Paprocki C, Grygier M, Lesiak M, Jemielity M, Perek B.

Abstract

BACKGROUND: Immediate initiation of cardiopulmonary resuscitation (CPR) increases the chances of return of spontaneous circulation (ROSC) and survival after out-of-hospital cardiac arrest (OHCA). For some refractory cases, extended cardiopulmonary resuscitation (ECPR) may be an intriguing option. AIMS: The aim of the study is to estimate the possibility of implementation of ECPR procedure to improve current early outcomes of patients after OHCA. METHODS: The medical charts of the Voivodship Emergency Station in Poznan from a 12-month period were assessed retrospectively. All OHCA cases were identified, and the following of potential inclusion criteria for ECPR was analyzed: initial defibrillation rhythm, age 18-65, CPR conducted by bystanders, and time to reaching the hospital < 40 minutes. RESULTS: In 46.7% of identified 1 233 OHCA cases, CPR was initiated by bystanders whereas an AED was applied only 17 times. An initial defibrillation rhythm was noted in 138 individuals (11.2%). Among the 65 patients who met the ECPR age criterion, 55 underwent CPR by bystanders leading to a no flow time which did not exceed 10 minutes. The additional 9 of them would be excluded due to length of time in reaching the hospital. This means that ECPR would be applicable in 46 OHCA subjects. CONCLUSIONS: Our analysis showed that in some sudden cardiac arrest subjects it would have been possible to implement ECPR procedure as a crucial part of OHCA Program and in a consequence probably to improve early outcomes of patients with the refractory and potentially reversible cardiac arrest.

FREE FULL TEXT

Are providers overconfident in predicting outcome after cardiac arrest?

Steinberg A(1), Callaway C(2), Dezfulian C(3), Elmer J(4).

Abstract

AIM: To quantify the accuracy of health care providers' predictions of survival and function at

hospital discharge in a prospective cohort of patients resuscitated from cardiac arrest. To test whether self-reported confidence in their predictions was associated with increased accuracy and whether this relationship varied across providers. METHODOLOGY: We presented critical care and neurology providers with clinical vignettes using real data from post-arrest patients. We asked providers to predict survival, function at discharge, and report their confidence in these predictions. We used mixed effects models to explore predictors of confidence, accuracy, and the relationship between the two. RESULTS: We completed 470 assessments of 62 patients with 65 providers. Of patients, 49 (78%) died and 9 (15%) had functionally favourable survival. Providers accurately predicted survival in 308/470 (66%) assessments. In most errors (146/162, 90%), providers incorrectly predicted survival. Providers accurately predicted function in 349/470 (74%) assessments. In most errors (114/121, 94%), providers incorrectly predicted favourable functional recovery. Providers were confident (median confidence predicting survival 80 [IQR 60 - 90]; median confidence predicting function 80 [IQR 60 - 95]). Confidence explained 9% and 18% of variation in accuracy predicting survival and function, respectively. We observed significant between-provider variability in accuracy (median odds ratio (MOR) for predicting survival 2.93, 95%CI 1.94 - 5.52; MOR for predicting function 5.42, 95%CI 3.01 - 13.2). CONCLUSIONS: Providers varied in accuracy predicting post-arrest outcomes and most errors were optimistic. Self-reported confidence explained little variation in accuracy.

CURES POST-RCE

Factors associated with return of spontaneous circulation after out-of-hospital cardiac arrest in Poland: a one-year retrospective study.

Czapla M(1), Zielińska M(2), Kubica-Cielińska A(3), Diakowska D(4), Quinn T(5), Karniej P(1).

Abstract

BACKGROUND: Out-of-hospital cardiac arrest (OHCA) is a common reason for calls for intervention by emergency medical teams (EMTs) in Poland. Regardless of the mechanism, OHCA is a state in which the chance of survival is dependent on rapid action from bystanders and responding health

professionals in emergency medical services (EMS). We aimed to identify factors associated with return of spontaneous circulation (ROSC). METHODS: The medical records of 2137 EMS responses to OHCA in the city of Wroclaw, Poland between July 2017 and June 2018 were analyzed. RESULTS: The OHCA incidence rate for the year studied was 102 cases per 100,000 inhabitants. EMS were called to 2317 OHCA events of which 1167 (50.4%) did not have resuscitation attempted on EMS arrival. The difference between the number of successful and failed cardiopulmonary resuscitations (CPRs) was statistically significant (p < 0.001). Of 1150 patients in whom resuscitation was attempted, ROSC was achieved in 250 (27.8%). Rate of ROSC was significantly higher when CPR was initiated by bystanders (p < 0.001). Patients presenting with asystole or pulseless electrical activity (PEA) had a higher risk of CPR failure (86%) than those with ventricular fibrillation/ventricular tachycardia (VF/VT). Patients with VF/VT had a higher chance of ROSC (OR 2.68, 1.86-3.85) than those with asystole (p < 0.001). The chance of ROSC was 1.78 times higher when the event occurred in a public place (p < 0.001). CONCLUSIONS: The factors associated with ROSC were occurrence in a public place, CPR initiation by witnesses, and presence of a shockable rhythm. Gender, age, and the type of EMT did not influence ROSC. Low bystander CPR rates reinforce the need for further efforts to train the public in CPR.

FREE FULL TEXT

Haemodynamics and vasopressor support during prolonged targeted temperature management for 48 hours after out-of-hospital cardiac arrest: a post hoc substudy of a randomised clinical trial.

Grand J(1), Hassager C(1), Skrifvars MB(2), Tiainen M(2), Grejs AM(3), Jeppesen AN(3), Duez CHV(4), Rasmussen BS(5), Laitio T(6), Nee J(7), Taccone F(8), Søreide E(9)(10), Kirkegaard H(4).

Abstract

BACKGROUND: Comatose patients admitted after out-of-hospital cardiac arrest frequently experience haemodynamic instability and anoxic brain injury. Targeted temperature management is used for neuroprotection; however, targeted temperature management also affects patients' haemodynamic status. This study assessed the haemodynamic status of out-of-hospital cardiac arrest survivors during prolonged (48 hours) targeted temperature management at 33°C. METHODS:

Analysis of haemodynamic and vasopressor data from 311 patients included in a randomised, clinical trial conducted in 10 European hospitals (the TTH48 trial). Patients were randomly allocated to targeted temperature management at 33°C for 24 (TTM24) or 48 (TTM48) hours. Vasopressor and haemodynamic data were reported hourly for 72 hours after admission. Vasopressor load was calculated as norepinephrine (μg/kg/min) plus dopamine(μg/kg/min/100) plus epinephrine (μg/kg/min). RESULTS: After 24 hours, mean arterial pressure (mean±SD) was 74±9 versus 75±9 mmHg (P=0.19), heart rate was 57±16 and 55±14 beats/min (P=0.18), vasopressor load was 0.06 (0.03-0.15) versus 0.08 (0.03-0.15) μg/kg/min (P=0.22) for the TTM24 and TTM48 groups, respectively. From 24 to 48 hours, there was no difference in mean arterial pressure (Pgroup=0.32) or lactate (Pgroup=0.20), while heart rate was significantly lower (average difference 5 (95% confidence interval 2-8) beats/min, Pgroup<0.0001) and vasopressor load was significantly higher in the TTM48 group (Pgroup=0.005). In a univariate Cox regression model, high vasopressor load was associated with mortality in univariate analysis (hazard ratio 1.59 (1.05-2.42) P=0.03), but not in multivariate analysis (hazard ratio 0.77 (0.46-1.29) P=0.33). CONCLUSIONS: In this study, prolonged targeted temperature management at 33°C for 48 hours was associated with higher vasopressor requirement but no sign of any detrimental haemodynamic effects.

TARGETED TEMPERATURE MANAGEMENT

Association Between Target Temperature Variability and Neurologic Outcomes for Patients Receiving Targeted Temperature Management at 36°C After Cardiac Arrest: A Retrospective Cohort Study.

Cordoza M(1), Thompson H(2)(3), Bridges E(2), Burr R(2), Carlbom D(4).

Abstract

Maintaining strict temperature control during the maintenance phase of targeted temperature management (TTM) after cardiac arrest may be an important component of clinical care. Temperature variability outside of the goal temperature range may lessen the benefit of TTM and worsen neurologic outcomes. The purpose of this retrospective study of 186 adult patients (70.4%

males, mean age 53.8 ± 15.7 years) was to investigate the relationship between body temperature variability (at least one body temperature measurement outside of 36°C ± 0.5°C) during the maintenance phase of TTM at 36°C after cardiac arrest and neurologic outcome at hospital discharge. Patients with temperature variability (n = 124 [66.7%]) did not have significantly higher odds of poor neurologic outcome compared with those with no temperature variability (odds ratio [OR] = 1.01, 95% confidence interval [CI] = 0.36-2.82). Use of neuromuscular blocking agents (NMBAs) and having an initial shockable rhythm were associated with both higher odds of good neurologic outcome (shockable rhythm: OR = 10.77, 95% CI = 4.30-26.98; NMBA use: OR = 4.54, 95% CI = 1.34-15.40) and survival to hospital discharge (shockable rhythm: OR = 5.90, 95% CI = 2.65-13.13; NMBA use: OR = 3.03, 95% CI = 1.16-7.90). In this cohort of postcardiac arrest comatose survivors undergoing TTM at 36°C, having temperature variability during maintenance phase did not significantly impact neurologic outcome or survival.

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PEDIATRIA

A Video-Based, Case-Control Study of Factors Associated With Intraosseous Catheterization During Pediatric Resuscitation.

Lee SH(1), Frey M(2), Kerrey BT(3), Zhang Y(4), Byczkowski T(2), Geis GL(3).

Abstract

STUDY OBJECTIVE: Factors associated with intraosseous (IO) catheterization are not well described. Our objective is to identify factors associated with the attempt and timing of IO catheterization in a

pediatric emergency department (ED) resuscitation setting. METHODS: We completed a video-based, case-control study (1:3 ratio) of children undergoing IO catheterization in the resuscitation area of a high-volume, academic, pediatric ED. We selected 8 independent factors a priori for analysis: younger than 2 years, Glasgow Coma Scale score less than 8, cardiopulmonary resuscitation (CPR), parent or caregiver presence, physician team leader with greater than 5 years of pediatric ED experience, 2 or more IO-catheterization-capable staff, ultrasonographically trained nurse vascular access team presence, and resuscitation occurring during the evening (4 pm to midnight) or overnight (midnight to 8 am) shift. We fit linear regression models to analyze for associations with IO access attempts and timing. RESULTS: One hundred fourteen patients were enrolled; 40 encounters involved IO catheterization (35.1%). Only CPR was associated with IO catheterization (odds ratio 39.0; 95% confidence interval 12.5 to 121.6). Mean time to IO attempt was shorter with CPR (3.2 versus 14.2 minutes) and longer with vascular access team presence (23.5 versus 3.4 minutes) or caregiver presence (10.5 versus 2.6 minutes). Of resuscitations that achieved peripheral intravenous access, only 1 (1.1%) did so in less than 90 seconds. CONCLUSION: CPR was the only factor associated with IO access attempts, whereas providers may have been more hesitant to attempt IO catheterization with vascular access team or caregiver presence. Future studies should include a larger, multicenter sample and use qualitative methods to explore reasons for IO catheterization hesitancy, especially in the nonarrest scenario.

A Systematic Review of Neuromonitoring Modalities in Children Beyond Neonatal Period After Cardiac Arrest.

Hunfeld M(1)(2), Ketharanathan N(1), Catsman C(2), Straver DCG(3), Dremmen MHG(4), Bramer W(5), Wildschut E(1), Tibboel D(1), Buysse C(1).

Abstract

OBJECTIVES: Postresuscitation care in children focuses on preventing secondary neurologic injury and attempts to provide (precise) prognostication for both caregivers and the medical team. This systematic review provides an overview of neuromonitoring modalities and their potential role in

neuroprognostication in postcardiac arrest children. DATA RESOURCES: Databases EMBASE, Web of Science, Cochrane, MEDLINE Ovid, Google Scholar, and PsycINFO Ovid were searched in February 2019. STUDY SELECTION: Enrollment of children after in- and out-of-hospital cardiac arrest between 1 month and 18 years and presence of a neuromonitoring method obtained within the first 2 weeks post cardiac arrest. Two reviewers independently selected appropriate studies based on the citations. DATA EXTRACTION: Data collected included study characteristics and methodologic quality, populations enrolled, neuromonitoring modalities, outcome, and limitations. Evidence tables per neuromonitoring method were constructed using a standardized data extraction form. Each included study was graded according to the Oxford Evidence-Based Medicine scoring system. DATA SYNTHESIS: Of 1,195 citations, 27 studies met the inclusion criteria. There were 16 retrospective studies, nine observational prospective studies, one observational exploratory study, and one pilot randomized controlled trial. Neuromonitoring methods included neurologic examination, routine electroencephalography and continuous electroencephalography, transcranial Doppler, MRI, head CT, plasma biomarkers, somatosensory evoked potentials, and brainstem auditory evoked potential. All evidence was graded 2B-2C. CONCLUSIONS: The appropriate application and precise interpretation of available modalities still need to be determined in relation to the individual patient. International collaboration in standardized data collection during the (acute) clinical course together with detailed long-term outcome measurements (including functional outcome, neuropsychologic assessment, and health-related quality of life) are the first steps toward more precise, patient-specific neuroprognostication after pediatric cardiac arrest.

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RECERCA EXPERIMENTAL

Cerebral Blood Flow-Guided Manipulation of Arterial Blood Pressure Attenuates Hippocampal Apoptosis After Asphyxia-Induced Cardiac Arrest in Rats.

Wang CH(1)(2), Chang WT(1)(2), Huang CH(1)(2), Tsai MS(1)(2), Liu SH(3)(4)(5), Chen WJ(1)(2)(6).

Abstract

Background In most post-cardiac arrest patients, the autoregulation mechanism of cerebral blood flow (CBF) is dysregulated. We examined whether recovery of CBF by adjusting mean arterial pressure mitigates post-cardiac arrest neuronal damage. Methods and Results Wistar rats that underwent 8-minute asphyxia-induced cardiac arrest and resuscitation were computer-randomized to norepinephrine or control groups. The CBF was measured at the dorsal hippocampal CA1 region of the left hemisphere. In the norepinephrine group, the mean arterial pressure was adjusted to recover CBF to 80% to 100% of baseline. Twenty-four hours following resuscitation, neurological outcomes were assessed, and brain tissues and blood samples were harvested for neuronal apoptosis and injury assessment. Thirty resuscitated rats were randomized into 2 groups, each containing 12 rats that completed the experiments. Norepinephrine infusion effectively prevented posthyperemia hypoperfusion and recovered CBF to pre-arrest baseline levels; a moderate positive linear correlation between mean arterial pressure and CBF during this period was also observed (P<0.001). There were no significant between-group differences in neurological recovery. In the norepinephrine group compared with the control group, upregulated cleaved caspase-3 protein expression in brain tissue determined by Western blot was reduced (P=0.02) and the densities of apoptotic cells in hippocampal CA1 and CA3 regions determined by terminal deoxynucleotidyl transferase-mediated dUTP biotin nick-end labeling were decreased (P<0.001). No significant differences in serum neuron-specific enolase or S100β levels were detected between the 2 groups. Conclusions CBF recovery demonstrated neuroprotective effects by reducing activation of cerebral apoptosis and number of apoptotic neurons. However, these effects did not significantly improve clinical neurological function, necessitating further investigation.

FREE FULL TEXT

Extracorporeal membrane oxygenation for near fatal asthma with sudden cardiac arrest.

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Abstract

Introduction Near fatal asthma is a life-threatening disorder that requires mechanical ventilation. Near fatal asthma and COPD with sudden cardiac arrest can worsen the outcomes. Previous studies demonstrated that ECMO is a live-saving measure for near fatal asthma that does not respond to traditional treatment. Case study A patient with near fatal asthma (NFA) and COPD presented with high airway resistance, life-threatening acidemia and severe hypoxemia that failed to respond to conventional therapy. His hospital course was complicated by sudden cardiac arrest when preparing to initiate V-V mode extracorporeal membrane oxygenation (ECMO). The mode immediately changed from V-V to V-A, then to V-AV and finally to V-V mode in order to improve cardiac function and promote recovery of lung function. Results On the sixth day, ECMO was removed and on the ninth day, he was extubated and transferred to the ward. Finally, the patient was discharged home on the nineteenth day after admission to be followed up in the pulmonary clinic. Conclusions The early application of ECMO and mode changing plausibly resulted in dramatic improvement in gas

exchange and restoration of cardiac function. This case illustrates the critical role of ECMO mode changing as salvage therapy in NFA and COPD with sudden cardiac arrest.

SMA: Case report of a patient suffering cardiac arrest during Nuss procedure (to treat pectus excavatum) in a patient with coronary-to-pulmonary arterial shunts.

2. J Cardiothorac Surg. 2020 Jun 12;15(1):139. doi: 10.1186/s13019-020-01180-5.

Sudden cardiac arrest during Nuss procedure for pectus excavatum.

Kim DY(1), Jeong JY(2).

Abstract

Cardiac arrest during the Nuss procedure is the most serious complication and is related to cardiac injury by the surgical instruments and pectus bars. To avoid the cardiac injury, there are several techniques with various devices, including crane and wire suture, lifting hook, the Kent or Langenbeck retractor, and the Vacuum Bell device. However, a case of cardiac arrest without direct cardiac injury during the Nuss procedure has been reported in the pectus excavatum patient with coronary-to-pulmonary arterial shunts. Recently, we encountered a case of cardiac arrest without cardiac abnormalities in preoperative studies and cardiac injury during the Nuss procedure.

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